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GEOGRAPHIC BORDER CROSSING:
IMPLICATIONS FOR VOLUME
PERFORMANCE STANDARDS

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GEOGRAPHIC BORDER CROSSING: IMPLICATIONS FOR VOLUME PERFORMANCE STANDARDS

ABSTRACT

This paper presents information on geographic border crossing for the use of Medicare physician services. The results are that there is substantial geographic variation across both states and urban and rural areas in border crossing to seek services. As might be expected, there is more border crossing across smaller geographic areas than among states. Predominantly rural areas tend to be major importers of services, while urban areas, on average, export services. Border crossing tends to be greater for high technology services such as advanced imaging, cardiovascular surgery, and oncology procedures. Border crossing has important implications for future refinements of the Medicare volume performance standards (MVPS) policy established by Congress in 1989. For example, volume performance standards that would be directed at subnational areas may not be able to simply apply the same target rates of growth in all areas. That is, the large variation in use of services that remain for many Medicare services, after accounting for border crossing, suggests there may be need for some geographic adjustments to volume performance standards. Otherwise, there will be no greater incentives to limit service provision in very high utilization areas than elsewhere; while at the same time, areas with low levels of utilization will experience fee reductions if all areas together exceed their targets.

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I. INTRODUCTION

This paper analyzes the extent to which Medicare beneficiaries travel across geographic borders to receive physician services and identifies the types of services for which this occurs most frequently. Border crossing has important implications for future refinements of the Medicare volume performance standards (MVPS) policy established by Congress in 1989.¹ Under the present policy, updates for fees could be limited if the growth in expenditures for physician services exceeds the MVPS target for a given year. Other than allowing for different rates for surgery and nonsurgical services, the same target rate of growth is applied to all areas in the country.

A potential limitation of this policy is that the behavior of any individual physician has such a small impact on the overall growth in expenditures that there may be no real incentive to modify behavior. Smaller MVPS geographic areas would be desirable because they would magnify the impact of any physician's behavior on the group and, as such, would strengthen the incentives for physicians to control the volume of services they provide. In addition, the smaller the area, the more physicians can identify other physicians who provide a high volume of services and apply peer pressure to modify practice patterns. Adopting a subnational approach to MVPS based on geographic areas could allow for differential fee update for each area depending on the relationship between the area's standard and the actual rate of growth in spending.

Although small areas with relatively few providers would result in strong incentives to modify behavior, they are unlikely to be self-contained markets

1. Omnibus Budget Reconciliation Act of 1989 (OBRA 1989), PL 101-239.

for physician services. As a result, it may be hard to justify a small-area MVPS policy whose goal is volume control when beneficiaries are free to use services outside of their area of residence. This type of policy could be rendered ineffective for many of the same reasons that Health Maintenance Organizations (HMOs) seek to control their costs by limiting opportunities for "out-of-plan" use. Even if physicians in an area respond to the incentives and limit the growth in service volume, a substantial amount of border crossing by beneficiaries may offset any cost savings. Thus, it would be difficult to hold the area's physicians accountable. In order to assess the desirability of alternative subnational MVPS areas, it will be useful to understand the extent of border crossing that is implied by each type of area. For example, although Metropolitan Statistical Areas (MSAs) may seem to provide reasonably strong incentives, they may be subject to such a high degree of border crossing that states are perceived as more viable.

A second and equally important issue is whether there should be uniform target rates of growth in fees when there is extensive cross-sectional variation in the provision of Medicare services. This variation may reflect either real differences in beneficiary use rates or patterns of border crossing in order to receive services that are not widely available. In other words, high volume areas of service provision may be due to high utilization rates of the beneficiaries living in the area or to the fact that beneficiaries from other areas entered the market. Conversely, low volume areas may reflect low use among the residing beneficiary population or because residents travel elsewhere to receive care.

Volume performance standards that applied the same limits on the rate of growth in expenditures in all areas would tend to keep existing variations in service provision in place. However, variations in rates of service provision

would not in themselves be a problem if beneficiary use rates did not vary by more than amounts considered acceptable by policymakers, e.g., if there were sufficient amounts of border crossing by beneficiaries from low- to high-volume areas. On the other hand, if high service provision in certain areas is the result of high beneficiary use rates and not border crossing, policymakers may want to establish targets with lower rates of growth; higher target rates may be desired in areas with low service provision if they also have low beneficiary use rates. This issue also requires a clear understanding of the present patterns of border crossing and the degree to which they result in reducing variations across areas in beneficiary utilization rates.

Prior research on border crossing has tended to focus on inpatient hospital care (see e.g., Hogan 1988; Bronstein and Morrissey 1990; Buczek 1991; and McGuire and Porell 1984).² This paper differs from earlier work in a number of important ways. First, the study focuses exclusively on border crossing for physician services among Medicare beneficiaries. Second, the geographic areas that are used cover the entire nation and can all be derived from the current set of physician payment localities.³ We are able to analyze

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2. In most instances, these studies used detailed data from a single state or county. The only studies of the extent of border crossing for ambulatory services that we could identify were Kleinman and Makuc (1983) and Makuc, Kleinman and Pierre (1985). Using data from the 1978 Health Interview Survey, these authors examined counties and several types of areas that are aggregations of counties to measure border crossing across the entire country. They used the percentage of visits received outside of the patients area of residence as their primary indicator. Not surprisingly, they found border crossing more common when the county, as opposed to an aggregation of counties, is used as the geographic basis of the analysis, i.e., smaller areas are more frequently associated with border crossing than large areas. In addition, they showed that border crossing occurred more among rural residents and was more likely to be associated with seeking the care of specialists than primary care physicians. Of particular note with respect to the issue of Medicare MVPS, they showed that patterns of border crossing for the 65 and over population were similar to those of other age groups.
 3. These geographic areas differ from those recently proposed by the Physician Payment Review Commission (1991) and from those recommended by Welch and Zuckerman (1991).

the exporting and importing of medical services for different kinds of geographic areas, including rural areas as well as small and large cities; we also examine border crossing by state within regions of the country. Third, we examine border crossing for different types of Medicare physician services; e.g., is a border crossing greater for high technology services than for, say, office visits? Fourth, we explore the extent to which border crossing results reduces the variation in beneficiary utilization rates. To accomplish this, we show differences between levels of service provision in geographic areas and levels of beneficiary utilization in the same areas. We conclude with discussion of a policy option that would allow policymakers to establish subnational MVPS targets that applied to the areas in which physicians practice but incorporated information on levels of beneficiary utilization.

The fundamental conclusion of the paper is that there is a great deal of geographic border crossing by Medicare beneficiaries in the United States. (Throughout the paper we adopt the convention of referring to areas as being importers and/or exporters of services, not to the alternative of being exporters or importers of beneficiaries.) This is particularly true for urban and rural areas. Rural areas tend to be major importers of services; large cities which are adjacent to other large cities also tend to be importers. Very large cities, as well as large nonadjacent cities, and small cities, are substantial exporters of services. There is also significant exporting and importing of services across states, though less than at the substate level. Rural states tend to be importers; large urbanized states tend to be exporters. There is also significant variation within regions, with rural states within a region tending to be importers and urbanized states exporters. Finally, there tends to be substantially more importing and exporting of technologically

sophisticated services than for more routine evaluation and management services.

II. METHODS

This paper uses the 1988 BMAD beneficiary file. This data set provides information on utilization of physician services for a 5 percent sample of Medicare beneficiaries, and on the Medicare provider locality in which the service was provided. The file, however, does not obtain any information on the area of residence of the beneficiary. In order to measure utilization rates based on the locality in which the beneficiary resides we have merged information on the county of residence to the BMAD beneficiary file from the Health Insurance Skeleton Write-Off (HISKEW) file. Using the county of residence together with an algorithm that maps from county to the Medicare provider, we are able to identify (in some cases, approximate) the provider locality in which the beneficiary resides. This augmented file then contains information on the provider locality in which the beneficiary resides as well as the provider locality in which each service that the beneficiary uses was provided.

Given these data, there are two general ways of measuring border crossing. The first can be called net flows. This is defined as the ratio of services or allowed charges used by beneficiaries residing in a given geographic area to services or allowed charges produced in that area. When this ratio is less than one, the area can be viewed as a net exporter of services; ratios greater than one imply net importing. For example, assume an area produces \$1.0 billion of Medicare physician services and that beneficiaries in that area use \$0.9 billion; the area would have a net flow ratio of 0.90. The ratio of 0.90 would mean that the beneficiaries in an area use 10 percent fewer services than

the area produces and therefore the area is exporting 10 percent of its services to beneficiaries in other areas.

An alternative way of analyzing border crossing is to examine gross flows. This approach would provide information on both the services exported as well as services imported by an area. For example, a given area may have a net flow ratio of 1.00, implying neither net exporting or importing, yet have a relatively large amount of both exporting and importing. Another area may have the same net flow ratio but have small amounts of exporting and importing. By examining gross flows as well as net flows we can observe these patterns. In the results that are presented below, both approaches are used.

Before these statistics can be computed, however, the specific areas defining the borders must be selected. The two most obvious types of geographic areas that can be derived from the Medicare localities are (1) states themselves, and (2) substate areas that are related to MSA/non-MSA definitions. Substate areas cannot precisely track MSA/non-MSA definitions in all states because locality boundaries often do not conform to the same criteria. Using the localities in this way will provide guidance as to whether the MSA/non-MSA distinction could provide a suitable basis for subnational MVPS targets. Clearly, making use of MSA/non-MSA areas for MVPS would require a considerable reconfiguration of the payment localities.

To examine border crossing across state boundaries, some accommodation is made to existing carrier designations. For example, we retained the carrier division between northern and southern California and between upstate and downstate New York. In downstate New York, however, we have included Queens with the New York City metropolitan area. Our preliminary analysis of the data showed an extraordinary amount of border crossing by Queens beneficiaries. This is an artifact of New York City geographic boundaries and did not seem to

be of sufficient merit to keep it separate from the rest of New York City. Our approach also uses the Washington, D.C. carrier designation, which includes adjacent counties in Maryland and Virginia. The Kansas City carrier is split into its Kansas and Missouri localities which are then considered parts of those states. In summary, our state/carrier designation is equivalent to the state, except for the treatment of California, New York, the District of Columbia, Maryland, and Virginia.

Substate areas related to the MSA/non-MSA concept can be derived from the present localities in 29 of the 51 states (including the District of Columbia). For the remaining 22 states, there is no way to disaggregate below the state level. Either the entire state is the provider locality, or the provider localities were not meaningful geographic market areas. However, even in the 29 states that can be divided, a precise application of MSA definitions was not always possible. In some cases we were able to group localities into areas that were the same as an MSA (e.g., New York City), while in others we were forced to work with areas that were clusters of MSAs (e.g., Large cities in Pennsylvania or Small cities in Alabama). The end result is that the 240 Medicare localities is reduced to 121 substate or statewide geographic areas.

Seven categories of areas are defined. These are:

- o Very large cities;
- o Adjacent large cities;
- o Non-adjacent large cities;
- o Small cities;
- o Small cities and rural areas;
- o Rural areas; and
- o Statewide.

Table 1 indicates the cities or the geographic areas that are within each classification system. Very large cities include the ten largest MSAs in terms

Table 1

Designation of Medicare Payment Localities

VERY LARGE CITIES	NONADJACENT LARGE CITIES	SMALL CITIES	SMALL CITIES/RURAL	STATEWIDE
San Francisco, Cal metro area	Birmingham, Ala	Small cities, Ala	Small cities/rural Iowa	Arkansas
Washington, DC metro area	New Orleans, La	Mobile, Ala	Small cities/rural Kan	Colorado
Miami, Fla	Sacramento, Cal	Small cities, La	Small cities/rural Neb	Delaware
Chicago, Ill	Santa Clara/Monterey, Cal	Stockton, Cal	Small cities/rural Ky	Montana
Urban Mass	North and North Central Fla	Merced, Cal	Small cities/rural Mass	New Hampshire
Detroit, Mich	Indiana metro areas	Fresno, Cal	Small cities/rural Mich	Vermont
NYC metro area	Kansas City metro area	Monterey, Cal	Small cities/rural Minn	North Dakota
Large cities, Penn	Buffalo, NY	Bakersfield, Cal	Northeast Tex	South Dakota
Houston, Tex	Rochester, NY	Small cities, Ill	Southeast Tex	New Jersey
Los Angeles, Cal	San Antonio, Tex	Small cities, Ind	Western Tex	Rhode Island
	Dallas, Tex	Iowa City, Iowa	Small cities/rural Wash	South Carolina
	Seattle, Wash	Omaha, Neb	Small cities/rural Wisc	Utah
	Milwaukee, Wisc	Lexington/Louisville, Ky	Small cities/rural Ore	Alaska
	Phoenix, Ariz	N. Central cities, NY	Small cities/rural Conn	Hawaii
	Atlanta, Ga	Small cities, Penn	Small cities/rural Va	Nevada
	Portland, Ore	Fort Worth, Tex	Small cities/rural Mo	New Mexico
Oakland/Berkeley, Cal	San Diego, Cal	Tucson, Ariz	Small cities/rural Ohio	Idaho
San Bernadino/Riverside, Cal	Hartford, Conn	Small cities, Ga	Small cities/rural WV	Tennessee
Fort Lauderdale, Fla	New Haven, Conn	Oklahoma City, Ok	Small cities/rural MD	Wyoming
East St. Louis, Ill	St. Paul/Minneapolis, Minn	Tulsa, Ok		North Carolina
Poughkeepsie/North NYC suburbs	Tidewater, Va	Santa Barbara, Cal		Mississippi
Ventura, Cal	St. Louis, Mo	Stamford, Conn		Maine
Anaheim/Santa Ana, Cal	Akron/Youngstown, Ohio	Richmond, Va		
	Cincinnati, Ohio	Charleston, Wv		
	Cleveland, Ohio		RURAL	
	Columbus, Ohio		Rural Ala	
	Dayton/Springfield, Ohio		Rural La	
	Baltimore, MD		Northern Rural Cal	
			Rural Fla	
			Rural Ill	
			Rural Ind	
			Rural NY	
			Rural Penn	
			Rural Ariz	
			Rural Ga	
			Rural Ok	

of population. Since our designation of cities is constrained by the definition of Medicare localities, in some instances we were forced to group cities with surrounding areas to approximate an MSA. For example, in San Francisco we have included San Mateo and Marin counties. Washington, D.C. includes adjacent counties in Maryland and Virginia. Pennsylvania large cities include Pittsburgh, Philadelphia and Scranton.

Large cities adjacent to very large cities is a group of cities with more than 100,000 Medicare enrollees contiguous to one of the ten largest MSAs. For example, Oakland/Berkeley is adjacent to San Francisco and San Bernadino/Riverside is adjacent to Los Angeles. Non-adjacent large cities are similarly sized cities, in terms of Medicare enrollment, that are not contiguous to a very large MSA. These include Birmingham, Alabama; New Orleans, Louisiana; Baltimore, Maryland; Dallas, Texas, and others.

Small cities include MSAs with less than 100,000 Medicare enrollees. These include Mobile, Alabama; Stockton and Bakersfield, California; Iowa City, Iowa; Tucson, Arizona and Tulsa, Oklahoma. Small cities and rural areas includes both small MSAs and rural areas where it was impossible because of the Medicare locality structure to separate the small city from the rural area. Rural areas could be defined in 11 states and are entirely rural, in that they contain no counties that are part of an MSA. Most of the 22 states that could not be subdivided are small states, but some are not, e.g., North Carolina, New Jersey, Tennessee, and Colorado.

Because the classification system is built on the basis of Medicare payment localities, the outcome is far from perfect. The results that we will present below are to some degree a product of the geographic boundaries of the physician payment localities that we have included. The geographic boundaries in some Medicare localities are tightly drawn around the urban core; others

include more outlying areas. This will have some effect on the results, but the end result does permit us to obtain a fairly clear picture of the extent of border crossing to use Medicare services.

In order to examine border crossing by type of service, we use a new procedure classification system for Medicare services developed as part of this project by the Urban Institute (see Berenson and Holahan 1990). This type of service classification system, shown in Table 2, divides Medicare services into 4 major categories and 20 subcategories. The first major group is evaluation and management services; it includes office visits, hospital visits, emergency room services, home and nursing home visits, consultations, and specialist evaluation and management services. Specialist evaluation and management services includes a range of evaluation and management services provided by ophthalmologists, psychiatrists, pathologists, allergists, and other subspecialties.

The second major group is procedures. This includes major procedures, subdivided into cardiovascular, orthopedic, and other, ambulatory procedures which, subdivided into eye and other, and minor procedures, including endoscopies and oncology procedures. Imaging is the third major group and is divided into standard imaging (routine x-rays and nuclear medicine), advanced imaging (CT scans and magnetic resonance imaging), sonographic imaging, and imaging/procedures (largely cardiac catheterization). The final major group is tests, divided into laboratory and other tests. Other tests is dominated by a wide range of cardiovascular tests.

Table 2

Type of Service Classification System
(Numbers of Procedure Codes, Allowed Charges, 1988)

	HCPCS Codes	Allowed Charges (in millions)	% of All Allowed Charges
Evaluation and Management Services (M)			
Office Visits	54	\$3,151.7	11.64%
Hospital Visits	39	3,105.5	11.47%
Emergency Room Services	21	327.9	1.21%
Nursing Home and Home	94	364.3	1.35%
Specialty Specific Eval. & Mgmt. Serv.	221	1,254.0	4.63%
Consultations	21	929.2	3.43%
Procedures (P)			
Major Procedures			
Cardiovascular	474	1,475.6	5.45%
Orthopedic	647	853.4	3.15%
Other	1400	1,609.3	5.94%
Ambulatory Procedures			
Eye	208	2,386.7	8.82%
Other	1270	942.5	3.48%
Minor Procedures			
Oncology Services	992	821.2	3.03%
Endoscopy Procedures	171	454.8	1.68%
Dialysis Services	380	1,228.8	4.54%
	53	233.7	0.86%
Imaging Procedures (I)			
Standard Imaging	1001	1,582.9	5.85%
Advanced Imaging	141	715.0	2.64%
Sonography	96	689.9	2.55%
Imaging/Procedure	259	512.0	1.89%
Tests (T)			
Lab Tests	1510	1,425.8	5.27%
Other Tests	524	1,188.7	4.39%
Anesthesiology (A)			
		1,126.7	4.16%
Other (O)			
A-V HCPCS Codes (except M,P,R)		468.8	1.73%
W-Z Local Codes		66.9	0.25%
Other Unassigned		159.5	0.59%
	9,576	\$27,074.8	100.00%

SOURCE: Tabulations from the 1985 and 1988 BMAD procedure files.

III. RESULTS

In this section we examine border crossing at various area levels using the designations of geographic areas presented in Table 1. Table 3 summarizes the net flows across these areas. The first row indicates that the net flow ratio is 1.00 for the nation; that is, the flows across geographic areas balance out, as one would expect. The table also shows that very large cities are net exporters; that is, they produce approximately 8 percent more services, or \$.6 billion more in allowed charges, than are used by beneficiaries living in those areas. Adjacent large cities are net importers, with services used by beneficiaries approximately 6 percent more than services provided. Nonadjacent large cities, on the other hand, are the largest net exporters in terms of allowed charges (\$.9 billion). They produce approximately 14 percent more services than are used by beneficiaries living in those areas. Small cities had \$.5 billion more in allowed charges exported than imported, that is, producing approximately 20 percent more services than are used in small cities. The small cities/rural areas are large importers of services. They use about 26 percent more services, or \$.8 billion in allowed charges, than are produced in those areas. Finally, rural areas are very large importers of services, using approximately \$.9 billion in allowed charges, or 70 percent more services than are provided in rural areas. The residual statewide areas, consisting of the 22 states in Table 1, use about as much care as they produce, on balance.

Table 4 provides information on gross flows, the exporting and importing of services. It is of interest to compare this table with Table 3. Table 4 indicates that, on balance, all areas export and import about 15 percent of both services and charges. Very large cities have exports amounting to about 13 percent of their allowed charges, while importing about 6 percent of all

Table 3
 Border Crossing Among Geographic Areas
 All Services—Allowed Charges
 (Net Flows)

Area Classification	Services Used (in \$ billions of Allowed Charges)	Services Produced (in \$ billions of Allowed Charges)	Net Flow Ratio**
ALL AREAS	\$25.1	\$25.1	1.00
Very Large Cities	6.3	6.9	0.92
Large Cities - Adjacent	1.7	1.6	1.06
Large Cities - Nonadjacent	4.9	5.8	0.86
Small Cities	2.0	2.5	0.80
Small Cities/Rural	4.1	3.3	1.26
Rural	2.2	1.3	1.71
Statewide*	3.8	3.8	1.00

* Twenty-two states which were not disaggregated.

** The net flow ratio is defined as the ratio of services (allowed charges) used by beneficiaries residing in a geographic area to services (allowed charges) produced in that area. For example, the net flow ratio of .92 means that very large cities produce 8 percent more services than beneficiaries residing in very large cities use.

Source: Tabulations from the 1988 BMAD Beneficiary File.

Table 4
Border Crossing Among Geographic Areas
All Services
(Gross Flows)

Geographic Area	Services and Allowed Charges by Area Beneficiaries				Services and Allowed Charges by Area Providers			
	Services per Enrollee	Percent Imported	Allowed Charges per Enrollee	Percent Imported	Services per Enrollee	Percent Exported	Allowed Charges per Enrollee	Percent Exported
All Areas	20.53	14.9	830.06	15.4	20.53	14.9	830.06	15.4
Very Large Cities	24.70	8.6	1093.12	6.1	25.98	13.1	1183.76	13.3
Large Cities - Adjacent	25.39	18.1	1164.77	18.1	24.27	14.3	1098.83	13.2
Large Cities - Nonadjacent	20.46	8.4	841.45	7.2	22.96	18.4	982.56	20.6
Small Cities	18.86	18.3	761.56	17.3	22.50	31.5	954.30	34.0
Small Cities/Rural	18.51	22.2	682.78	27.1	15.49	7.0	540.83	8.0
Rural	18.79	40.8	736.31	47.4	12.29	9.6	430.90	10.2
Statewide*	18.92	6.3	698.46	8.3	20.28	12.6	698.13	8.3

* Twenty-two states that could not be disaggregated.

Source: Tabulations from the 1988 BMAD Beneficiary File.

allowed charges received. Adjacent large cities export even more services than do very large cities. However, they are substantially greater importers, with allowed charges for imported services amounting to about 18 percent of all allowed charges. Nonadjacent large cities and small cities are the largest exporters of services, with 21 and 34 percent of allowed charges, respectively. Small cities are also rather large importers as well, with imports amounting to 17 percent of allowed charges. Not surprisingly, small cities/rural areas and rural areas are the largest importers of services, with imports amounting to 27 and 47 percent of all allowed charges, respectively. But these areas also export services, with exports amounting to 8 and 10 percent of allowed charges produced, respectively.

The next set of tables look at border crossing by type of service. Table 5 present information on net flows across geographic areas for each of the evaluation and management services. Border crossing for office visits and emergency room care tends to be relatively low. As might be expected, it is even lower for home and nursing home visits, even in rural areas. Not surprisingly, the specialist evaluation and management services and consultations, services that tend to be provided more by medical and surgical subspecialties, had the largest amounts of exporting by very large cities, nonadjacent large cities, and small cities, and the greatest amount of importing by small cities/rural and rural areas. These reflect the fact that individuals living in outlying areas must go to urban areas for the services of ophthalmologists, psychiatrists, and other specialists.

Table 6 examines border crossing for major procedures. Here, the net flows are considerably greater than for most evaluation and management services. Among major procedures, net importing and exporting are particularly large for cardiovascular procedures. Very large cities provide about 18

Table 5
Border Crossing Among Geographic Areas (Net Flows)
Evaluation and Management Services
(Allowed Charges)

Area Classification	Office Visits	Hospital Visits	Emergency Room Services	Home and Nursing Home	Specialist Evaluation & Management Services	Consulta- tions
All Areas	1.00	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.96	0.94	0.97	0.97	0.91	0.93
Large Cities - Adjacent	1.03	1.02	1.00	0.97	1.08	1.05
Large Cities - Nonadjacent	0.92	0.89	0.92	1.00	0.87	0.86
Small Cities	0.84	0.78	0.84	0.89	0.77	0.79
Small Cities/Rural	1.13	1.22	1.12	1.05	1.27	1.34
Rural	1.36	1.52	1.35	1.15	1.72	2.00
Statewide*	1.02	1.01	1.00	1.03	1.03	1.02

* Twenty-two states which were not disaggregated.

Source: Tabulations from the 1988 BMAD Beneficiary File.

Table 6
 Border Crossing Among Geographic Areas (Net Flows)
 Major Procedures
 (Allowed Charges)

Area Classification	Major Procedures Other	Major Cardio- vascular	Major Ortho- Pedic
All Areas	1.00	1.00	1.00
Very Large Cities	0.89	0.82	0.89
Large Cities - Adjacent	1.12	1.20	1.09
Large Cities - Nonadjacent	0.85	0.73	0.84
Small Cities	0.77	0.77	0.78
Small Cities/Rural	1.26	1.58	1.23
Rural	1.74	3.27	1.81
Statewide*	1.03	1.06	1.01

* Twenty-two states which were not disaggregated.

Source: Tabulations from the 1988 BMAD Beneficiary File.

percent more cardiovascular procedures than are used in those areas. The ratio of exports to imports are even larger for nonadjacent large cities and for small cities. On the other hand, beneficiaries in adjacent large cities have allowed charges of about 20 percent more for cardiovascular procedures than physicians in those areas provide. Individuals in rural areas have allowed charges (used) that are more than three times as great for cardiovascular procedures as allowed charges produced in those areas. The same pattern applies but to a lesser degree for other major procedures as well as orthopedic procedures.

Similar patterns apply for ambulatory procedures (Table 7). Importing of these procedures is particularly high for rural areas, especially for oncology procedures. Similarly, very large cities, nonadjacent large cities, and small cities are large net exporters of all ambulatory, oncology, and endoscopy procedures. There is less border crossing for all types of areas for minor procedures. As will be seen later, the limited amount of border crossing for minor procedures contributes to wide variation in use rates.

Table 8 examines imaging services and tests. Here there is also a considerable amount of exporting and importing of services. The amount of border crossing increases with the complexity of the service. There is less border crossing for standard imaging than for other services. For standard imaging services, very large cities provide about 7 percent more (allowed charges) than are used in those cities. At the other extreme, rural areas use approximately 61 percent more than they produce. For advanced imaging, very large cities, nonadjacent large cities, and small cities are large exporters. Small cities in particular provide about 25 percent more advanced imaging services (allowed charges) than are used by enrollees in those cities. At the

Table 7
Border Crossing Among Geographic Areas (Net Flows)
Ambulatory Procedures
(Allowed Charges)

Area Classification	Ambulatory Procedures Other	Ambulatory Procedures Eye	Minor Procedures	Oncology Services	Endoscopy Procedures
All Areas	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.92	0.90	0.95	0.88	0.93
Large Cities - Adjacent	1.07	1.10	1.03	1.05	1.05
Large Cities - Nonadjacent	0.87	0.84	0.91	0.83	0.88
Small Cities	0.81	0.77	0.83	0.73	0.76
Small Cities/Rural	1.20	1.28	1.18	1.34	1.22
Rural	1.68	1.74	1.58	2.23	1.71
Statewide*	1.01	1.02	1.02	1.05	1.01

* Twenty-two states which were not disaggregated.

Source: Tabulations from the 1988 BMAD Beneficiary File.

Table 8

. Border Crossing Among Geographic Areas (Net Flows)
Imaging and Tests
(Allowed Charges)

Area Classification	Standard Imaging	Advanced Imaging	Sonography	Imaging Procedures	Laboratory Tests	Other Tests
All Areas	1.00	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.93	0.93	0.93	0.83	0.98	0.94
Large Cities - Adjacent	1.04	1.03	1.05	1.17	1.03	1.06
Large Cities - Nonadjacent	0.89	0.86	0.88	0.76	0.90	0.89
Small Cities	0.79	0.75	0.79	0.71	0.99	0.82
Small Cities/Rural	1.19	1.27	1.19	1.42	1.41	1.16
Rural	1.61	1.81	1.66	3.21	1.98	1.55
Statewide*	1.02	1.01	1.04	1.04	0.71	1.04

* Twenty-two states that could not be disaggregated.

Source: Tabulations from the 1988 BMAD Beneficiary File.

other extreme, individuals living in rural areas use 81 percent more advanced imaging procedures than are produced in those areas. Even greater contrasts exist for imaging/procedures. Very large cities produce more than 16 percent more imaging/procedures than are used by beneficiaries living in those areas. Nonadjacent large cities and small cities are even greater net exporters. At the other extreme, individuals living in rural areas use over three times as many imaging/procedures as rural areas produce.

Laboratory tests exhibit a slightly different pattern. Very large cities, nonadjacent large cities, and small cities remain exporters but by much smaller margins than for other services. Small cities/rural and rural areas remain relatively large net importers. The major explanation for this somewhat different pattern for laboratory tests reflects the role of high-volume, out-of-state laboratories in performing laboratory tests. The statewide areas, for example, are substantial net exporters because of large laboratories in New Jersey, Delaware, and North Carolina. This pattern will become evident later when examining border crossing by state.

Other tests reflect a pattern exhibited elsewhere, in that very large cities, nonadjacent large cities, and small cities are relatively large exporters of such tests. Adjacent large cities, small cities/rural, and particularly rural areas are large net importers of these services. These patterns reflect that a large proportion of these services are provided by specialists, particularly cardiologists, who tend to locate in urban areas.

Border Crossing Among States

Table 9 provides information on net flows across state borders. The definition of states used in this paper, as described earlier, is equivalent to

Table 9

Border Crossing Among States/Carriers
All Services

Location	All Services	Location	All Services
<u>New England</u>		<u>East North Central</u>	
Connecticut	.99	Illinois	1.07
Massachusetts	.97	Indiana	1.01
Maine	1.06	Michigan	1.03
New Hampshire	1.09	Ohio	1.01
Rhode Island	1.02	Wisconsin	1.02
Vermont	1.10		
<u>Middle Atlantic</u>		<u>West North Central</u>	
New Jersey	1.04	Iowa	1.12
New York, Downstate	1.00	Kansas	1.03
New York, Upstate	1.04	Minnesota*	.82
Pennsylvania	.99	Missouri	.94
		North Dakota	.87
		Nebraska	1.00
		South Dakota	.96
<u>South Atlantic</u>		<u>Mountain</u>	
District of Columbia**	.90	Arizona	.97
Delaware	.70	Colorado	1.00
Florida	.98	Idaho	1.22
Georgia	.99	Montana	1.08
Maryland**	1.03	New Mexico	1.10
North Carolina	.90	Nevada	.93
South Carolina	1.11	Utah	.98
Virginia**	1.08	Wyoming	1.49
West Virginia	1.02		
<u>East South Central</u>		<u>Pacific</u>	
Alabama	1.03	Alaska	1.18
Kentucky	1.00	California, Northern	1.04
Mississippi	1.10	California, Southern	.95
Tennessee	.91	Hawaii	1.00
		Oregon	1.02
		Washington	1.00
<u>West South Central</u>			
Arkansas	1.05		
Louisiana	.98		
Oklahoma	1.06		
Texas	.98		

Source: Tabulations from the 1988 BMAD Beneficiary File.

* This low ratio for Minnesota reflects a large amount of allowed charges billed by the Mayo Clinic using other than HCPCS codes; they could not be classified into the type of service system. Total allowed charges for the exceptions/unclassified category for Minnesota was \$257.19. A very large share (77.3% of allowed charges) was provided to out-of-state residents.

** The District of Columbia includes adjacent Maryland and Virginia counties; these counties are therefore excluded from Maryland and Virginia.

actual states except for New York, California, Washington, D.C., Maryland, and Virginia. In general, there is less border crossing across state borders than among our designated geographic areas. There tends to be more border crossing in rural states than in heavily urbanized states, reflecting the patterns shown in the more disaggregated areas. In addition, more rural states tend to be net importers and heavily urbanized states to be net exporters. States that have large populations tend to have less net importing or exporting. This seems to be due to the fact that the importing and exporting that does occur is relative to a larger base in a large state than in a small state. Border crossing over state lines is also affected by the presence of border cities.

Some interesting patterns can be illustrated by examining two regions: the New England and Mountain states. In New England, Maine, New Hampshire, Rhode Island, and Vermont tend to be net importers. Massachusetts is a net exporter of all types of services. This may reflect the fact that the latter has large teaching hospitals and is therefore likely to provide services to beneficiaries in the other states in the region. New Hampshire, Vermont, and Maine may also have a significant amount of border crossing along their long, shared borders. The Mountain state region follows a similar pattern. Idaho, Montana, New Mexico, and Wyoming all tend to be very larger importers of services. Arizona, Nevada, and Utah are all net exporters. Colorado is a net exporter for most individual types of services. All of these have major cities and appear to export services to the other states in the region.

States that have large cities on their borders tend, not surprisingly, to have a larger amount of importing or exporting. For example, Illinois is a net importer and Missouri a net exporter. Much of this is due to exporting by St. Louis, Missouri and importing by East St. Louis, Illinois. North Dakota has two small urban areas on the Minnesota border, a relatively small population

base, and therefore tends to be a rather large net exporter. Iowa is a relatively large net importer; much seems to be due to importing of services from Omaha, Nebraska.

Table 10 provides data on gross flows for all services among states. Again, a number of findings are of interest. Many of these can be illustrated by examining the South Atlantic region. There, the District of Columbia metropolitan area is a relatively large exporter of services, but still imports about 5 percent of all care. Virginia and Maryland (excluding by definition the counties adjacent to the District of Columbia) both import more services than they provide. This offsets the pattern observed for the District of Columbia. Delaware, being a small state with one major city but in close proximity to a major metropolitan area (Philadelphia), tends to both export and import a relatively large percentage of physician services. It is a major exporter of lab services, which explains the very high percentage of services exported. This also explains why it is a much higher exporter of services than of allowed charges. North Carolina is also a large net exporter; it also exports a large amount of laboratory services. South Carolina, in contrast, imports a substantially higher share of its services than it exports. This suggests border crossing and the use of services in North Carolina by South Carolinians. West Virginia is a relatively large importer and exporter of services. This reflects the large number of urban areas on the West Virginia border, including cities both in West Virginia and in neighboring states.

The next set of tables provides information on border crossing among states by type of service. The last row indicates the number of states with net flow ratios of less than .95 or greater than 1.05. Though these thresholds are arbitrary, they provide an indication of the degree of border crossing among states. There are a number of important findings. First, Table 11 shows

Table 10
Border Crossing Among Geographic Areas
All Services
(Gross Flows)

Census Division/State	Services and Allowed Charges by Area Beneficiaries				Services and Allowed Charges by Area Providers			
	Services per Enrollee	Percent Imported	Allowed Charges per Enrollee	Percent Imported	Services per Enrollee	Percent Exported	Allowed Charges per Enrollee	Percent Exported
All States	20.53	8.1	830.06	7.5	20.53	8.1	830.06	7.5
New England								
Connecticut	20.30	6.3	836.12	6.5	20.52	7.3	841.62	7.1
Massachusetts	21.47	6.1	860.96	4.4	21.56	6.5	884.21	6.9
Maine	17.26	10.1	616.85	9.4	16.21	4.3	583.88	4.3
New Hampshire	17.75	18.2	612.34	23.1	16.98	14.5	561.79	16.2
Rhode Island	24.03	9.7	843.82	8.4	23.15	6.2	827.72	6.7
Vermont	16.42	19.9	585.74	24.3	15.15	13.2	531.19	16.6
Middle Atlantic								
New Jersey	20.22	12.5	887.63	12.0	21.25	16.7	850.24	8.1
New York, Downstate	24.85	11.7	1122.01	6.1	23.27	5.6	1124.35	6.3
New York, Upstate	18.87	8.1	695.92	8.2	18.21	4.8	668.58	4.4
Pennsylvania	19.05	6.9	790.61	5.4	18.76	5.5	797.00	6.1
South Atlantic								
District of Columbia	25.07	7.3	1114.34	6.0	29.26	20.6	1242.97	15.7
Delaware	18.01	15.2	751.19	17.1	48.35	68.4	1067.72	41.7
Florida	28.31	6.8	1239.26	6.6	28.60	7.7	1259.13	8.1
Georgia	20.00	8.1	761.08	7.3	19.95	7.8	765.94	7.9
Maryland	13.84	16.8	622.05	13.1	12.75	9.7	603.80	10.5
North Carolina	17.72	4.8	615.19	5.6	24.49	31.1	684.92	15.2
South Carolina	18.51	14.3	617.11	13.7	16.44	3.5	554.16	3.9
Virginia	19.34	14.3	660.28	12.3	17.43	4.9	612.98	5.5
West Virginia	16.11	17.7	609.86	15.3	15.12	12.3	595.28	13.3
East South Central								
Alabama	20.01	9.6	758.79	8.4	18.90	4.3	738.42	5.8
Kentucky	19.59	7.0	665.38	9.0	20.62	11.7	664.37	8.8
Mississippi	20.19	11.1	637.68	14.7	18.97	5.3	579.62	6.1
Tennessee	19.33	6.4	668.78	5.4	20.60	12.1	734.01	13.8
West South Central								
Arkansas	20.52	10.6	737.74	11.8	19.64	6.6	704.88	7.7
Louisiana	22.44	3.6	867.90	3.3	22.48	3.7	881.65	4.8
Oklahoma	19.60	8.2	736.54	10.2	18.76	4.1	693.87	4.7
Texas	17.53	3.1	774.65	2.7	17.63	3.7	791.32	4.8

Table 10 (continued)
Page 2

Census Division/State	Services and Allowed Charges by Area Beneficiaries				Services and Allowed Charges by Area Providers			
	Services per Enrollee	Percent Imported	Allowed Charges per Enrollee	Percent Imported	Services per Enrollee	Percent Exported	Allowed Charges per Enrollee	Percent Exported
East North Central								
Illinois	18.53	10.7	784.23	10.4	17.25	4.1	732.84	4.1
Indiana	17.66	9.9	659.41	9.8	17.13	7.1	650.50	8.5
Michigan	28.84	4.3	960.99	5.6	28.27	2.4	932.43	2.7
Ohio	20.19	8.0	793.13	6.3	19.38	4.2	783.66	5.2
Wisconsin	17.94	7.0	642.81	8.1	17.54	4.9	629.19	6.1
West North Central								
Iowa	19.16	11.6	594.87	17.1	17.98	5.8	532.98	7.5
Kansas	19.15	7.9	735.56	7.1	18.50	4.6	715.05	4.6
Minnesota	16.28	8.7	528.43	11.8	18.29	18.7	643.48	27.6
Missouri	16.86	9.0	593.59	9.7	17.57	12.7	628.91	14.8
North Dakota	19.83	6.6	681.50	7.9	22.00	15.8	786.86	20.2
Nebraska	17.61	9.9	574.18	12.1	17.09	7.2	574.14	12.1
South Dakota	17.56	9.8	583.14	13.6	18.24	13.2	607.85	17.1
Mountain								
Arizona	20.16	8.6	910.05	8.5	20.83	11.5	941.42	11.5
Colorado	20.73	6.5	541.02	8.9	21.17	8.5	542.28	9.1
Idaho	15.46	17.3	576.98	23.9	13.73	7.0	474.13	7.4
Montana	14.83	12.5	570.21	13.4	13.69	5.2	530.26	6.8
New Mexico	17.03	15.0	707.07	13.8	15.28	5.2	644.86	5.42
Nevada	20.05	13.7	1153.28	12.1	20.71	16.4	1245.59	18.6
Utah	14.49	6.2	563.49	6.6	14.35	5.3	576.16	8.7
Wyoming	15.28	28.8	544.16	*36.9	11.41	4.7	364.96	6.0
Pacific								
Alaska	9.85	24.3	495.47	25.7	8.45	11.8	418.80	12.1
California, Northern	18.78	9.3	905.78	8.0	17.78	4.2	873.62	4.6
California, Southern	25.60	3.3	1363.37	2.9	26.88	7.9	1429.86	7.4
Hawaii	19.28	3.5	849.72	4.5	19.49	4.5	854.01	5.0
Oregon	17.74	6.6	648.76	8.4	17.72	6.4	638.01	6.8
Washington	20.99	6.3	836.60	5.6	20.67	4.9	835.70	5.5

Source: Tabulations from the 1988 BMAD Beneficiary File.

Table 11

Border Crossing Among States/Carriers — Evaluation and Management Services (Net Flows)

Location	Office Visits	Hospital Visits	Emergency Room Visits	Non-hospital Non-specialist Visits	Specialist, Evaluation & Management Services	Consultations
New England						
Connecticut	1.01	1.01	1.06	1.00	1.03	.99
Massachusetts	.98	.99	.98	.98	.96	.96
Maine	1.03	1.04	1.02	.99	1.05	1.07
New Hampshire	1.05	1.06	1.14	1.22	1.07	1.12
Rhode Island	.99	1.00	1.03	1.00	1.01	1.03
Vermont	1.00	1.21	1.06	.92	1.04	1.05
Middle Atlantic						
New Jersey	1.05	1.04	1.03	1.05	1.10	1.03
New York, Downstate	.99	1.00	1.22	.98	.98	1.10
New York, Upstate	1.02	1.02	1.02	1.19	1.04	1.01
Pennsylvania	1.00	.99	1.03	.97	1.01	.99
South Atlantic						
District of Columbia	.96	.94	.95	.98	.93	.93
Delaware	1.01	1.06	1.08	1.06	.92	1.09
Florida	.98	.97	.95	.99	.98	.96
Georgia	1.00	.98	1.00	1.00	.97	.99
Maryland	1.02	1.01	.98	1.00	.95	.98
North Carolina	1.00	1.02	1.01	1.00	.98	1.00
South Carolina	1.05	1.08	1.05	1.02	1.10	1.15
Virginia	1.03	1.03	1.05	1.06	1.07	1.06
West Virginia	.98	1.02	.99	.97	.98	.99
East South Central						
Alabama	1.01	1.04	1.01	.99	1.03	1.03
Kentucky	1.00	.99	.99	1.00	1.04	1.01
Mississippi	1.06	1.09	1.06	1.03	1.11	1.12
Tennessee	.95	.91	.94	1.07	.89	.90
West South Central						
Arkansas	1.01	1.01	1.03	1.01	1.09	1.05
Louisiana	.99	.98	.99	.99	.98	.97
Oklahoma	1.04	1.04	1.03	1.01	1.03	1.10
Texas	.99	.98	.99	1.01	.98	.98
East North Central						
Illinois	1.05	1.04	1.01	1.01	1.05	1.05
Indiana	1.01	1.00	1.01	.97	1.00	1.02
Michigan	1.03	1.04	1.03	.99	1.02	1.03
Ohio	1.01	1.01	1.00	1.00	1.01	1.01
Wisconsin	1.00	1.02	.99	.99	1.03	1.02
West North Central						
Iowa	1.02	1.05	1.03	.99	1.03	1.03
Kansas	1.02	1.03	1.02	.98	1.02	1.04
Minnesota	1.05	1.02	1.04	1.01	1.02	1.04
Missouri	.97	.95	1.00	1.00	.93	.92
North Dakota	.91	.89	1.00	.92	.84	.81
Nebraska	.99	.96	1.03	1.02	.97	.96
South Dakota	1.00	.98	1.04	1.02	.86	.92
Mountain						
Arizona	.94	.96	.93	1.02	.99	.95
Colorado	1.01	.98	.98	1.00	1.00	.98
Idaho	1.06	1.15	1.43	.96	1.30	1.27
Montana	1.05	1.06	1.17	1.03	1.04	1.10
New Mexico	1.04	1.05	1.03	1.04	1.07	1.09
Nevada	.98	.87	.85	1.03	.94	.95
Utah	1.01	1.01	.98	.98	.99	.96
Wyoming	1.16	1.23	1.01	1.06	1.44	1.55
Pacific						
Alaska	1.02	.94	.81	1.08	2.05	1.19
California, Northern	1.01	1.02	.99	1.05	1.05	1.08
California, Southern	.97	.97	.98	.97	.95	.94
Hawaii	.97	.99	.92	1.02	.99	1.03
Oregon	1.00	1.05	1.03	1.05	1.03	1.05
Washington	1.01	1.01	1.00	1.00	.98	1.00

Number of States with Net
Flows Less than .95 or
Greater than 1.05

5

11

13

9

17

20

that there was relatively little border crossing for office visits, hospital visits, emergency room visits, and home and nursing home visits. This is not surprising given the patterns indicated earlier for the designated geographic areas. There is more border crossing for specialist evaluation and management services and for consultations. These are services typically provided by subspecialties and are not abundantly available in all states. Patterns observed elsewhere repeat themselves here. Rural and Mountain states tend to be net importers. More heavily urbanized states tend to be net exporters.

Table 12 provides data on the net flows across states/carriers for major procedures. There is a substantial amount of border crossing for cardiovascular procedures. States such as Massachusetts, downstate New York, Washington, DC, Colorado, Utah, Texas, and Tennessee seem to be major regional providers of cardiovascular procedures. Many other states are rather substantial net importers. These include Alaska, Wyoming, Idaho, Montana, Iowa, Mississippi, West Virginia, Delaware, New Jersey, and Vermont. Border crossing is significant for orthopedic procedures, presumably for more difficult procedures such as hip and knee replacements. There is less border crossing for other major procedures. These seem to be more widely available, and there is less border crossing as a result.

There are relatively large amounts of border crossing for ambulatory-eye procedures and for oncology (Table 13). There is significantly less border crossing for ambulatory/other, minor procedures, and endoscopies. The pattern of significant importing by rural states and exporting by heavily urbanized states continues.

Among imaging services, there is relatively little border crossing for standard imaging (Table 14). There is much more border crossing for advanced imaging but perhaps less than one might have expected. This may reflect the

Table 12

Border Crossing Among States/Carriers — Major Procedures (Net Flows)

Location	Major Procedures	Cardiovascular Procedures	Orthopedic Procedures
New England			
Connecticut	1.03	1.00	1.00
Massachusetts	.95	.94	.93
Maine	1.04	1.06	1.08
New Hampshire	1.17	.96	1.08
Rhode Island	1.05	.99	.99
Vermont	1.08	1.44	1.20
Middle Atlantic			
New Jersey	1.08	1.17	1.09
New York, Downstate	.95	.97	.98
New York, Upstate	1.04	1.12	1.02
Pennsylvania	1.00	.95	.99
South Atlantic			
District of Columbia	.95	.80	.94
Delaware	1.05	1.56	1.00
Florida	1.01	1.00	.99
Georgia	.97	1.00	1.03
Maryland	.95	1.14	1.00
North Carolina	1.00	1.02	1.00
South Carolina	1.09	1.09	1.12
Virginia	1.04	1.08	1.03
West Virginia	1.06	1.19	1.04
East South Central			
Alabama	1.01	.95	1.04
Kentucky	1.02	1.05	.98
Mississippi	1.12	1.32	1.03
Tennessee	.88	.83	.91
West South Central			
Arkansas	1.02	1.09	1.00
Louisiana	.96	.99	.97
Oklahoma	1.12	1.09	1.08
Texas	.97	.94	.96
East North Central			
Illinois	1.05	1.13	1.05
Indiana	1.00	.94	1.00
Michigan	1.03	1.08	1.06
Ohio	.99	.97	.99
Wisconsin	1.00	.97	1.00
West North Central			
Iowa	1.03	1.14	1.06
Kansas	1.01	1.01	.98
Minnesota	.99	1.00	1.02
Missouri	.92	.86	1.03
North Dakota	.89	.75	.72
Nebraska	.98	.87	1.02
South Dakota	.97	.89	.92
Mountain			
Arizona	.96	1.00	.99
Colorado	.97	.90	.90
Idaho	1.21	1.63	1.24
Montana	1.09	1.12	1.02
New Mexico	1.06	1.36	1.13
Nevada	.99	.94	.80
Utah	.97	.93	.90
Wyoming	1.60	1.73	1.23
Pacific			
Alaska	1.15	1.95	1.44
California, Northern	1.03	1.00	1.04
California, Southern	.94	.94	.94
Hawaii	1.06	.95	1.01
Oregon	1.01	1.00	1.02
Washington	1.00	1.00	.99

Number of States with Net
Flows Less than .95 or
Greater than 1.05

17

32

21

Table 13

Border Crossing Among States/Carriers — Ambulatory and Other Procedures

Location	Ambulatory Procedures Other	Ambulatory Procedures Eye	Minor Procedures	Oncology Services	Endoscopy Procedures
New England					
Connecticut	1.02	1.03	1.02	.98	1.00
Massachusetts	.97	.95	.99	1.02	.97
Maine	1.04	.99	1.02	1.04	1.03
New Hampshire	.99	1.26	1.01	1.04	1.05
Rhode Island	1.01	1.01	.98	.97	1.03
Vermont	1.04	.98	1.13	1.34	1.06
Middle Atlantic					
New Jersey	1.06	1.10	1.06	1.14	1.05
New York, Downstate	.98	.98	1.00	.99	.97
New York, Upstate	1.02	1.03	1.02	1.00	1.02
Pennsylvania	.99	.98	1.00	.99	1.00
South Atlantic					
District of Columbia	.91	.87	.96	.86	.93
Delaware	1.01	1.01	1.01	1.17	1.03
Florida	.99	.99	.98	.98	.99
Georgia	1.02	1.00	1.00	.95	1.00
Maryland	.97	1.02	1.01	1.05	1.00
North Carolina	1.00	.96	1.01	1.05	1.00
South Carolina	1.04	1.14	1.02	1.22	1.06
Virginia	1.07	1.13	1.04	1.08	1.05
West Virginia	.98	.93	.97	.94	1.01
East South Central					
Alabama	1.01	.99	1.00	1.05	1.02
Kentucky	.97	1.13	1.02	.88	1.02
Mississippi	1.09	1.06	1.10	1.14	1.04
Tennessee	.92	.91	.94	.88	.92
West South Central					
Arkansas	1.01	1.09	1.02	1.03	.97
Louisiana	.98	.98	.98	.98	.97
Oklahoma	1.11	1.01	1.08	1.16	1.05
Texas	.99	.98	.99	.96	1.00
East North Central					
Illinois	1.04	1.02	1.04	1.06	1.05
Indiana	1.02	1.01	1.00	1.00	1.00
Michigan	1.03	1.00	1.00	1.02	1.03
Ohio	1.00	1.01	1.01	1.03	.99
Wisconsin	.98	1.03	1.00	1.09	.99
West North Central					
Iowa	1.02	1.05	1.01	1.14	1.02
Kansas	1.00	1.03	1.01	1.08	1.01
Minnesota	1.05	1.06	1.04	1.17	1.03
Missouri	.96	.97	.98	.81	.95
North Dakota	.90	.84	.90	.83	.84
Nebraska	.99	1.04	1.00	.89	.96
South Dakota	.92	.82	1.03	.82	.93
Mountain					
Arizona	.96	.96	.97	1.02	.97
Colorado	.99	1.00	1.01	1.14	1.00
Idaho	1.17	1.22	1.13	1.00	1.12
Montana	1.10	1.02	1.04	.90	1.05
New Mexico	1.06	1.10	1.05	1.18	1.04
Nevada	.94	.87	.95	.87	.95
Utah	.92	.94	.98	1.09	.99
Wyoming	1.41	3.31	1.41	1.73	1.50
Pacific					
Alaska	1.34	1.50	1.07	1.50	1.05
California, Northern	1.03	1.06	1.02	.99	1.03
California, Southern	.95	.94	.96	.98	.95
Hawaii	1.00	1.03	1.00	1.09	1.00
Oregon	1.02	1.00	1.01	1.08	1.04
Washington	.99	.99	1.02	.98	1.00
Number of States with Net Flows Less than .95 or Greater than 1.05	14	20	9	29	8

Table 14

Border Crossing Among States/Carriers — Imaging and Tests

Location	Standard Imaging	Advanced Imaging	Sonography	Imaging Procedures	Laboratory Tests	Other Tests
New England						
Connecticut	1.00	1.01	1.04	1.03	.88	.78
Massachusetts	.97	.98	.95	.97	1.04	.98
Maine	1.05	1.06	1.07	1.07	1.42	1.06
New Hampshire	1.08	1.12	1.11	.95	1.18	1.09
Rhode Island	1.03	1.07	1.08	.97	1.19	1.00
Vermont	1.06	1.05	1.11	1.10	1.63	1.06
Middle Atlantic						
New Jersey	1.06	1.04	1.11	1.18	.70	1.08
New York, Downstate	.99	.99	1.01	.99	1.42	1.00
New York, Upstate	1.02	1.01	1.05	1.06	1.23	1.02
Pennsylvania	1.00	1.00	.98	.96	1.14	.99
South Atlantic						
District of Columbia	.93	.93	.92	.82	.66	.92
Delaware	1.04	1.00	1.05	1.82	.09	1.15
Florida	.98	.99	.96	.99	1.00	.98
Georgia	.98	.99	1.00	.99	1.03	.99
Maryland	1.01	1.00	1.03	.98	1.52	1.02
North Carolina	1.01	.99	1.00	1.00	.36	1.03
South Carolina	1.09	1.15	1.16	1.05	1.85	1.08
Virginia	1.03	1.06	1.04	1.09	1.69	1.03
West Virginia	.98	.98	.98	1.07	1.49	.98
East South Central						
Alabama	1.02	1.05	1.01	1.02	1.23	1.03
Kentucky	1.02	1.04	1.04	1.04	.78	1.01
Mississippi	1.08	1.16	1.08	1.28	1.17	1.10
Tennessee	.92	.88	.92	.83	.96	.93
West South Central						
Arkansas	1.01	1.04	1.01	1.07	1.28	1.01
Louisiana	.98	.97	.98	.99	1.07	.98
Oklahoma	1.07	1.09	1.12	1.13	1.04	1.10
Texas	.98	.97	.97	.94	1.04	.99
East North Central						
Illinois	1.07	1.08	1.06	1.11	1.15	1.07
Indiana	.99	.99	1.00	.98	1.20	1.01
Michigan	1.02	1.04	1.01	1.05	1.04	1.01
Ohio	1.00	1.01	1.01	.98	1.24	1.01
Wisconsin	.99	1.01	1.02	1.01	1.09	1.01
West North Central						
Iowa	1.07	1.04	1.05	1.16	1.20	1.06
Kansas	1.01	1.01	1.01	1.00	1.10	1.01
Minnesota	1.07	1.06	1.11	1.04	.98	1.07
Missouri	.95	.94	.96	.88	.96	.98
North Dakota	.86	.72	.85	.78	.90	.91
Nebraska	.93	.91	.94	.91	1.19	.95
South Dakota	.95	1.07	.89	.96	.86	1.00
Mountain						
Arizona	.96	.97	.91	.93	1.01	.97
Colorado	1.00	1.01	1.02	.91	1.09	1.01
Idaho	1.26	1.27	1.36	1.76	1.30	1.23
Montana	1.04	1.08	1.03	1.06	1.25	1.08
New Mexico	1.08	1.11	1.06	1.54	1.18	1.10
Nevada	.97	.94	.90	.82	1.05	.94
Utah	.98	.95	.97	.95	1.14	1.00
Wyoming	1.25	1.37	1.80	1.67	1.93	1.30
Pacific						
Alaska	1.08	1.25	1.17	1.56	1.49	1.13
California, Northern	1.03	1.06	1.02	1.01	1.19	1.03
California, Southern	.96	.95	.97	.91	.91	.96
Hawaii	.97	1.01	.99	.98	.99	1.00
Oregon	1.01	1.03	1.06	1.03	1.00	1.03
Washington	.99	.97	.98	.99	1.06	.99
Number of States with Net Flows Less than .95 or Greater than 1.05	16	22	21	26	38	21

relatively widespread diffusion of advanced imaging technology by 1988. A few states—South Carolina, Alaska, Wyoming, and Idaho—are exceptions to this pattern. Imaging/procedures which consist largely of cardiac catheterizations tend to follow the same pattern as major cardiovascular procedures. States that were major exporters of the latter are exporters of imaging/procedures and conversely areas that are major importers of cardiovascular procedures are importers here as well.

Finally, there are substantial amounts of exporting and importing of laboratory services. However, this follows a very different pattern than observed elsewhere. There are major national and regional laboratories in states such as New Jersey, Pennsylvania, Delaware, and North Carolina that produce laboratory services for Medicare beneficiaries all over the nation. The result is that most states tend to be importers of laboratory service, with a handful of states being exporters.

Does Border Crossing Equalize Utilization of Services?

Table 15 summarizes the variation in the use and provision of services. The two left-hand columns provide the means, coefficients of variation, and the range of services used in different geographic areas. The third and fourth columns provide the same information for services provided. The top panel provides this information for states and carriers; the lower panel provides the same information for our designated geographic areas. A number of important findings are contained in Table 16. The first is that there is substantially greater variation in services provided than in services used. The coefficients of variation are higher for the former both for services per enrollee and for allowed charges per enrollee. Similarly, the variation between the areas with the highest levels of services per enrollee and allowed charges per enrollee

Table 15
Variation in Services Used and Provided
Across Geographic Areas

	<u>Services Used</u>		<u>Services Provided</u>	
	<u>Services</u> per Enrollee	<u>Allowed</u> Charges per Enrollee	<u>Services</u> per Enrollee	<u>Allowed</u> Charges per Enrollee
ALL SERVICES				
<u>States/Carriers</u>				
Mean	19.17	745.05	19.56	744.04
C.V.	0.17	0.25	0.29	0.30
High	28.84	1363.37	48.35	1429.86
Low	9.85	495.47	8.45	364.96
<u>Designated Geographic Areas</u>				
Mean	19.71	797.25	20.50	834.10
C.V.	0.19	0.27	0.39	0.43
High	37.98	1833.58	58.06	2029.30
Low	9.85	495.47	7.55	177.64

Source: Tabulations from the 1988 BMAD Beneficiary File.

Table 16
Variations Among Areas in Use and Provision of Services
(Allowed Charges per Enrollee)

EVALUATION/MANAGEMENT	Services Used				Services Provided			
	States/Carriers		Designated Areas		States/Carriers		Designated Areas	
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Office Visits	\$92.85	0.33	\$99.38	0.36	\$92.54	0.35	\$102.30	0.43
Hospital Visits	86.26	0.32	91.70	0.33	86.00	0.36	96.20	0.49
Emergency Room Services	9.78	0.37	10.83	0.37	9.82	0.41	11.19	0.47
Non-Hospital,	9.68	0.52	10.44	0.48	9.64	0.53	10.53	0.50
Non-Specialist Visits								
Specialist Evaluation	34.09	0.34	37.77	0.40	34.46	0.38	39.45	0.56
& Management Service								
Consultations	24.48	0.49	26.64	0.54	24.26	0.54	27.73	0.68
MAJOR PROCEDURES								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Major-Other	48.45	0.23	50.91	0.22	47.62	0.26	53.45	0.42
Major-Cardiovascular	43.12	0.30	47.19	0.29	42.15	0.37	50.66	0.63
Major-Orthopedic	25.73	0.20	27.32	0.23	25.64	0.25	28.81	0.41
AMBULATORY & OTHER PROCEDURES								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Ambulatory-Eye	69.22	0.26	75.01	0.31	68.41	0.32	78.33	0.50
Ambulatory	26.62	0.28	28.75	0.32	26.45	0.31	29.77	0.44
Procedures-Other								
Minor Procedures	22.08	0.51	23.93	0.59	21.95	0.53	24.62	0.65
Oncology Services	13.01	0.39	14.83	0.42	12.98	0.45	15.88	0.64
Endoscopy Procedures	35.58	0.27	36.41	0.30	35.40	0.29	38.09	0.44
IMAGING & TESTS								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Standard Imaging	47.47	0.25	50.41	0.28	47.21	0.28	52.67	0.42
Advanced Imaging	20.43	0.38	22.14	0.36	20.27	0.43	23.49	0.54
Sonography	18.47	0.39	20.26	0.46	18.29	0.43	21.22	0.59
Imaging/Procedures	15.28	0.33	16.55	0.30	15.02	0.43	17.82	0.64
Laboratory tests	42.03	0.31	44.03	0.35	47.16	1.10	46.09	0.94
Other Tests	31.92	0.42	34.26	0.45	31.69	0.46	35.49	0.55

and the lowest is greater among services provided than among services used. These results are even more striking for the designated geographic areas, principally because the latter allows us to look at rural areas as well as very large cities.

These results indicate that border crossing results in utilization of services being considerably less variable than the provision of services. However, substantial variation in utilization rates across areas remains. There is a threefold variation among states/carriers in both services used per enrollee and allowed charges per enrollee. In addition, there is a fourfold variation across our designated geographic areas in both services used and allowed charges per enrollee. Thus, while border crossing provides a very useful function, it is not sufficient in itself to equalize utilization.

Tables 16 and 17 provide detailed information on services used and services provided by type of service. There are great differences among types of services in the relationship between areas' utilization and provision of services. In some cases, border crossing has reduced the amount of variation in utilization; in others, it has not. Variation in utilization is higher for services such as minor procedures, consultations, emergency room visits, oncology, advanced imaging, sonographic imaging, and other tests. It is somewhat lower for office visits, hospital visits, standard imaging, major procedures/other, ambulatory procedures/other, orthopedic surgery, and endoscopies. It is also relatively low, somewhat surprisingly, for cardiovascular surgery, imaging/procedures, laboratory tests, and ambulatory eye procedures.

The data presented in Tables 16 and 17 once again indicate that there is more border crossing across our designated geographic areas than across states/carriers. Comparisons of the coefficients of variation in the two

Table 17
Variations Among Areas in Use and Provision of Services
(Services per Enrollee)

EVALUATION/MANAGEMENT	Services Used				Services Provided			
	States/Carriers		Designated Areas		States/Carriers		Designated Areas	
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Office Visits	3.84	0.16	3.92	0.18	3.84	0.17	4.03	0.27
Hospital Visits	2.55	0.25	2.59	0.25	2.55	0.27	2.72	0.45
Emergency Room Services	0.28	0.32	0.29	0.29	0.28	0.33	0.30	0.41
Non-Hospital, Non-Specialist Visits	0.39	0.36	0.41	0.33	0.39	0.38	0.41	0.36
Specialist Evaluation & Management Service	0.97	0.29	1.02	0.32	0.97	0.31	1.07	0.48
Consultations	0.34	0.33	0.36	0.36	0.34	0.37	0.37	0.54
MAJOR PROCEDURES								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Major-Other	0.07	0.14	0.07	0.17	0.07	0.17	0.07	0.42
Major-Cardiovascular	0.05	0.30	0.06	0.32	0.05	0.35	0.06	0.57
Major-Orthopedic	0.02	0.20	0.02	0.23	0.02	0.22	0.02	0.42
AMBULATORY & OTHER PROCEDURES								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Ambulatory-Eye	0.06	0.21	0.07	0.26	0.06	0.27	0.07	0.47
Ambulatory Procedures-Other	0.15	0.22	0.16	0.27	0.15	0.24	0.16	0.42
Minor Procedures	0.84	0.46	0.90	0.59	0.83	0.48	0.93	0.68
Oncology Services	0.25	0.31	0.26	0.32	0.25	0.34	0.27	0.58
Endoscopy Procedures	0.15	0.16	0.15	0.20	0.15	0.18	0.16	0.39
IMAGING & TESTS								
	Mean	C.V.	Mean	C.V.	Mean	C.V.	Mean	C.V.
Standard Imaging	1.75	0.16	1.81	0.18	1.74	0.18	1.90	0.38
Advanced Imaging	0.15	0.20	0.15	0.21	0.15	0.23	0.16	0.46
Sonography	0.21	0.25	0.22	0.28	0.20	0.27	0.23	0.23
Imaging/Procedures	0.04	0.28	0.05	0.29	0.04	0.34	0.05	0.62
Laboratory tests	4.96	0.28	5.06	0.30	5.37	0.82	5.22	0.75
Other Tests	1.14	0.26	1.19	0.26	1.14	0.29	1.24	0.43

tables indicate there are not substantial differences when one looks at services used. On the other hand, the differences in the coefficients of variation between services used and services provided are higher in the designated geographic areas than in the states/carriers, particularly among procedures and imaging services. This suggests that there more border crossing across the smaller geographic areas to use services. Thus, the trade-off that was suggested earlier in the paper is evident in the data we present. Smaller geographic areas, while perhaps permitting greater control by physician organizations over provider behavior, would face much greater border-crossing. In contrast, using the states/carriers as the target areas would reduce the problem of border crossing, but result in weaker provider incentives.

The data provided in these tables can also be used to categorize types of services both by first the extent of border crossing and second by the degree of variation in utilization levels. This allows us to illustrate the role of border crossing in reducing variations and enhancing access to services across states/carriers, for example. We divided types of services into high and low border crossing by the number of states with a net flow ratio of either less than .95 or greater than 1.05 in Tables 11 through 14. Border crossing outside this range was considered to be high; border crossing within the range was considered to be low. For our purposes, if 20 or more states had high indices, the type of services was regarded as having high border crossing; and vice versa. Similarly, we used data on coefficients of variation in Table 16 to divide states/carriers into those with high and low variation. States/carriers with coefficients of variation of .35 or greater were regarded as having high variation; coefficients of variation below this were regarded as low. (The classification of types of services into high and low variation is slightly different if the data from Table 17 on services per enrollee are used, but

since allowed charges incorporates intensity as well as volume and price, we chose to use the information on allowed charges per enrollee in Table 16.)

The results are shown in Figure 1. They indicate that for many services border crossing is not important (Groups I and II); for most of these services (Group I), there are not substantial variations across areas. For some other types of services (Group III), Medicare beneficiaries quite often cross geographic borders and this contributes to reductions in area variations. For others (Group IV), however, substantial variation in utilization rates remains despite extensive border crossing.

The first group (Group I) includes services with low border crossing and low geographic variation. These include office and hospital visits, standard imaging, major procedures/other, ambulatory procedures/other, endoscopies, and specialist evaluation and management services. The low geographic variation coupled with the low levels of border crossing suggests relatively limited problems in access to these services. Since these include basic medical and surgical procedures, this should not be too surprising. It is somewhat surprising that endoscopy procedures are as widely available as they appear to be; this suggests that the diffusion of these procedures was fairly wide by 1988. Specialist evaluation and management services are close to the threshold between high and low variation; if the data on designated areas had been used, these services would be regarded as having high variation.

Group II includes nursing home and home visits, minor procedures, and emergency room visits, all exhibiting low border crossing but high variation in utilization rates. This is probably due to several different factors. High variation in nursing home and home visits may reflect the variation across the nation in the availability of nursing home beds. The variation in emergency room visits may reflect differences across areas in the importance of emergency

Figure 1

Border Crossing and Geographic Variation
in Use of Services

Border Crossing

<p style="text-align: center;">Group I LOW BORDER CROSSING LOW GEOGRAPHIC VARIATION</p> <p>Office Visits Hospital Visits Specialist Evaluation & Management Services Standard Imaging Major Procedures/Other Ambulatory Procedures/Other Endoscopy Procedures</p>	<p style="text-align: center;">Group II LOW BORDER CROSSING HIGH GEOGRAPHIC VARIATION</p> <p>Nursing Home & Home Visits Minor Procedures Emergency Room Visits</p>	<p>Geographic Variation in Use of Services</p>
<p style="text-align: center;">Group III HIGH BORDER CROSSING LOW GEOGRAPHIC VARIATION</p> <p>Cardiovascular Procedures Imaging/Procedures Laboratory Tests Ambulatory Eye Procedures Orthopedic Procedures</p>	<p style="text-align: center;">Group IV HIGH BORDER CROSSING HIGH GEOGRAPHIC VARIATION</p> <p>Oncology Procedures Advanced Imaging Sonographic Imaging Other Tests Consultations</p>	

rooms in providing basic medical care services. The high variation in minor procedures may reflect the fact that these services are often discretionary and of less urgency. In areas where there is less access to specialists, particularly dermatologists, Medicare beneficiaries may simply go without these services.

The third set of services (Group III) are those with high levels of border crossing but low variation across geographic areas in use. These are cardiovascular procedures, imaging/procedures, orthopedic procedures, laboratory services, and ambulatory/eye procedures. The high level of border crossing for laboratory services reflects the major role of national laboratories; this kind of border crossing is clearly different because it reflects where the test was produced, not actual travel by beneficiaries. The high levels of border crossing for the other services in this group probably reflects the importance that beneficiaries place on these services and a high level of willingness to travel in order to obtain these services.

The final set of services (Group IV) has high levels of border crossing but high variation in utilization across states/carriers. These services are oncology procedures, advanced imaging, sonographic imaging, other tests, and consultations. With the exception of consultations, these are all relatively high technology procedures. They include radiation treatment, CT scans, magnetic resonance imaging, various kinds of sonographic procedures, and a range of cardiovascular tests. Consultations are usually provided by subspecialties, for whom there is large geographic variation in availability. The high border crossing suggests that individuals are willing to cross borders to use these services. However, the high variation that remains suggests that there may be widespread differentials in access to these services.

IV. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has presented information on geographic border crossing for the use of Medicare services. The results are that there is substantial geographic variation across both states and urban and rural areas in border crossing to seek services. As might be expected, there is more border crossing across smaller geographic areas than among states. Rural areas tend to be major importers of services. Adjacent large cities are also importers of services. Not surprisingly, large urban areas are exporters of most medical care services. Even small cities are significant net exporters of services, principally because they are surrounded by rural areas. Similar patterns occur across states. States that are largely rural tend to be importers of services. Heavily urbanized states tend to be exporters. Border crossing among states seemed to vary with the size of the state and to be affected by geographic anomalies such as border cities. Finally, border crossing tends to be greater for high technology services such as advanced imaging, cardiovascular surgery, and oncology procedures.

In the beginning of this paper we suggested that volume performance standards that would be directed at subnational areas may not be able to simply apply the same target rates of growth in all areas. That is, the large variation in use of services that remain for many Medicare services, after accounting for border crossing, suggests there may be need for some geographic adjustments to volume performance standards. Otherwise, there will be no greater incentives to limit service provision in very high utilization areas than elsewhere; while at the same time, areas with low levels of utilization will experience fee reductions if all areas together exceed their targets. Wennberg (1982) raised similar issues of differentials in beneficiary

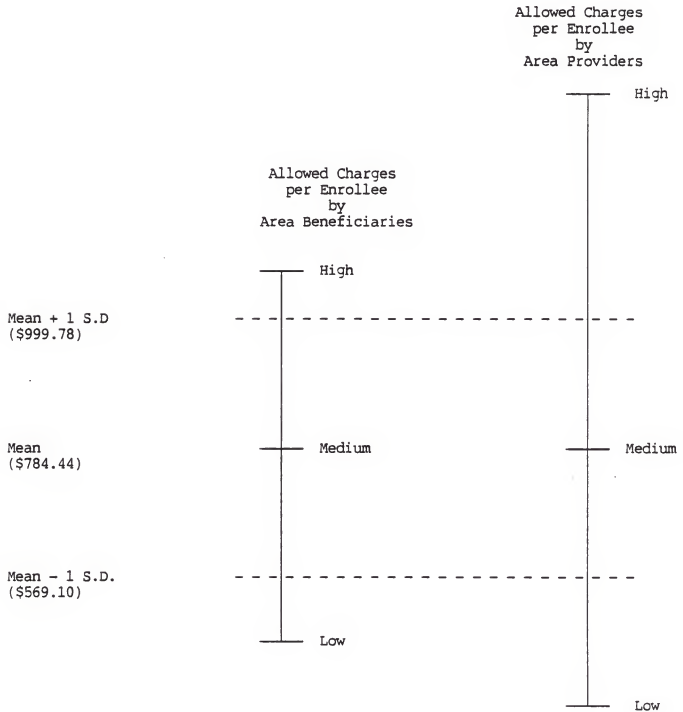
utilization when considering the inappropriateness of hospital regulations that control the rate of growth in costs but ignore area variations in per capita hospital expenditures. He also argued that pricing insurance policies uniformly within an area that includes both high- and low-cost markets is inequitable. In both cases, Wennberg claims these practices perpetuate subsidies from low-cost to high-cost markets that insulate patients in the high-cost markets from the full economic consequences of their behavior.

In the following, we suggest a method for using information on beneficiary utilization to adjust volume performance standards applied to providers if this is desired. Tables 15 through 17 illustrated the variation in service utilization as reflected in allowed charges by area beneficiaries as well as service provision as reflect in allowed charges by providers. As discussed, there is more variation in the latter than in the former. By using information on the variation around the mean for allowed charges per enrollee, we obtained hypothetical thresholds of "acceptable" levels of beneficiary utilization (Figure 2). For the purposes of discussion, we use data on allowed charges per enrollee. More refined measures, using information on volume and intensity or adjusting for age and sex differences, may be more appropriate and could be used when they become available. As shown in Figure 2, the mean of allowed charges per enrollee across geographic areas is \$784.44. The dotted lines indicate the mean of allowed charges per enrollee plus or minus one standard deviation.

While this threshold is arbitrary (any other could be applied if chosen), it allows us to divide data on beneficiary utilization rates into three levels. The first would be deemed high utilization, that is, levels of allowed charges per enrollee greater than the mean plus one standard deviation. The second would be medium levels of utilization which are in the range of the mean plus

Figure 2

Using Thresholds of Beneficiary Utilization to Establish
Adjustments to Volume Performance Standards



or minus one standard deviation. The third level would be deemed low levels of utilization; i.e., levels of allowed charges per enrollee which are less than the mean minus one standard deviation. By applying the thresholds derived from data on beneficiary utilization to the data on allowed charges by area providers, we can also divide services provided by physicians into three categories: high, medium, and low. Clearly more areas will fall into the high and low regions in the latter case.

Volume performance standards could continue to be established in the same way as is done currently, on the basis of historical growth rates. If allowed charges produced by area providers and allowed charges used by area beneficiaries both fall in the middle range, no adjustment to the MVPS target would be made. However, areas with high and low levels of beneficiary utilization could have target rates of growth reduced or increased, respectively. For example, areas where allowed charges provided as well as utilized both exceed the threshold might have a target rate of growth that is reduced by some "efficiency" factor. However, if an area had allowed charges per enrollee provided in excess of the threshold but allowed charges used by area beneficiaries in the middle range, no adjustment would be made. In this case, providers would be performing a useful social function by exporting services to beneficiaries from other geographic areas and therefore would not be given a lower target rate of growth.

If allowed charges by area providers were in the low range but allowed charges by area beneficiaries were in the middle range, no adjustment would be made. Here again the low provision by area providers is not a problem because individuals living in these areas historically have crossed geographic borders to use services elsewhere. However, if allowed charges produced by area

providers and allowed charges used by area beneficiaries are also in the low range, then a higher target rate of growth could be applied to that area.

Table 18 provides information on how our designated geographic areas would be affected by such a scheme. (Table 19 provides the same information for states/carriers.) The first column lists areas where both beneficiary utilization and services provided both exceed the threshold. Column one also contains one area in which the beneficiary level of utilization exceeds the threshold but the provider is in the middle range; in such a case, beneficiaries are evidently able to cross geographic boundaries easily to use services. This raises a question of how such areas should be treated. Either nothing could be done or these areas could also receive lower than average targets.

The second column indicates the areas in which providers have a high level of service provision but beneficiary utilization is in the middle range. The third column indicates areas in which both the levels of service provision and the levels of beneficiary utilization are in the middle range. The fourth column indicates areas where providers are low but use of services by beneficiaries is in the middle range. Such areas would receive the national average target rate of growth.

The fifth column indicates areas where both beneficiary utilization and service provision are below the threshold. Such areas would be ones in which the target rates of growth could be considered for an upwards adjustment. The fifth column also indicates two areas where beneficiary levels of utilization are low but services provided are in the middle range. Such areas may or may not be adjusted. The fifth column also shows a strange result in which the beneficiary levels of utilization are below the threshold but the levels of

Table 18

Distribution of Designated Geographic Areas by Levels of Service Utilization and Provision

BENEFICIARY HIGH/ PROVIDER HIGH	BENEFICIARY MIDDLE/ PROVIDER HIGH	BENEFICIARY MIDDLE/ PROVIDER MIDDLE	BENEFICIARY MIDDLE/ PROVIDER LOW	BENEFICIARY LOW/ PROVIDER LOW
New Orleans, LA	Birmingham, AL	Sm Cities AL	East St. Louis, IL	Sm Cities/Rural NE
Ft. Lauderdale, FL	Dallas, TX	Mobile, AL	Mississippi	Sm Cities/Rural MN
Miami, FL	Lexington/Louisville, KY	Arkansas	New Hampshire	Alaska
Detroit, MI	N Central Cities NY	Northern Rural CA	Poughkeepsie/N NYC Suburbs	Idaho
New York City Metro	Oklahoma City, OK	Sacramento, CA	Rural AL	Wyoming
Los Angeles, CA	Omaha, NE	Oakland/Berkeley, CA	Rural AZ	Colorado
Anaheim/Santa Ana, CA	Portland, OR	Stockton, CA	Rural GA	Montana
San Diego, CA	Richmond, VA	Santa Clara/Monterey, CA	Rural IL	Sm Cities/Rural WI
Bakersfield, CA	Seattle, WA	Merced, CA	Rural IN	Utah
DC + MD/VA Suburbs	Sm Cities GA	Fresno, CA	Rural LA	Sm Cities/Rural WV
N/NC FL cities	Sm Cities LA	Monterey, CA	Rural NY	
Nevada	Tulsa, OK	Rural FL	Rural OK	
Santa Barbara, CA	Tucson, AZ	Sm Cities IL	Rural PA	
Ventura, CA	Urban MA	Chicago, IL	Sm Cities/Rural CT	
	Houston, TX	Metropolitan IN	Sm Cities/Rural OR	BENEFICIARY LOW/ PROVIDER MIDDLE
	Phoenix, AZ	Sm Cities IN	Sm Cities/Rural IO	
	Delaware	Sm Cities/Rural KS	Sm Cities/Rural KY	Iowa City, IO
		Sm Cities/Rural MI	Sm Cities/Rural MA	
BENEFICIARY HIGH/ PROVIDER MIDDLE		Buffalo, NY	Sm Cities/Rural MO	
		Rochester, NY	Sm Cities/Rural OH	
		North Dakota	Sm Cities/Rural VA	
		New Jersey	South Carolina	
		Large Cities PA	Vermont	
San Bernadino/Riverside, CA		Sm Cities PA	Sm Cities/Rural CT	BENEFICIARY LOW/ PROVIDER HIGH
		Kansas City, KS		
		Rhode Island		
		Northeast TX		St. Louis, MO
		Southeast TX		St. Paul/Minneap, MN
		Western TX		
		Fort Worth, TX		
		Sm Cities/Rural WA		
		Milwaukee, WI		
		Atlanta, GA		
		Hawaii		
		New Mexico		
		Tennessee		
		North Carolina		
		Hartford, CT		
		Stamford, CT		
		New Haven, CT		
		Tidewater, VA		
		Akron/Youngstown, OH		
		Cincinnati, OH		
		Cleveland, OH		
		Columbus, OH		
		Dayton/Springfield, OH		
		Charleston, WV		
		San Antonio, TX		
		San Fran/San Mateo/Marin, CA		
		Maine		
		Sm Cities/Rural MD		
		Baltimore, MD		
		South Dakota		

Table 19

Distribution of States/Carriers by Levels of Service Utilization and Provision

BENEFICIARY HIGH/
PROVIDER HIGH

Arizona
District of Columbia
Florida
Nevada
New York, Downstate
Michigan
Southern California

BENEFICIARY HIGH/
PROVIDER MIDDLE

Northern California

BENEFICIARY MIDDLE/
PROVIDER HIGH

Delaware

BENEFICIARY MIDDLE/
PROVIDER MIDDLE

Alabama
Arkansas
Connecticut
Georgia
Hawaii
Illinois
Kansas
Kentucky
Louisiana
Massachusetts
North Carolina
North Dakota
New Jersey
New Mexico
New York, Upstate
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
Tennessee
Texas
Virginia
Washington
West Virginia
Indiana
Wisconsin
Maryland

BENEFICIARY MIDDLE/
PROVIDER LOW

Iowa
Maine
Mississippi
New Hampshire
South Carolina

BENEFICIARY LOW/
PROVIDER MIDDLE

Missouri
South Dakota
Minnesota

BENEFICIARY LOW/
PROVIDER LOW

Vermont
Idaho
Nebraska
Montana
Utah
Wyoming
Colorado
Alaska

services provided are above the threshold (St. Louis, Missouri). This reflects the extremely large amount of border crossing from East St. Louis into St. Louis. Again, this area could be unadjusted or receive a higher rate of growth target to encourage even higher levels of service provision. The essence of this mechanism is essentially establishing thresholds of beneficiary utilization and adjusting provider volume standards growth accordingly. This would permit a volume performance standard policy to adjust for levels of beneficiary utilization even when the performance standards are addressed to areas where physicians practice.

The other major issue addressed by this paper is whether states or, alternatively, substate areas might be used as the basis of volume performance standards. The data presented in this paper suggest that there is substantially greater border crossing at the sub-state level (within the state) than across state lines. Sub-state areas thus have a major disadvantage in that border crossing could result in instability in growth rates over time, resulting in unwarranted rewards and penalties under MVPS. In contrast, states could be used as the areas for MVPS without significant concern over the impact of border crossing on provider incentives. (The issue of laboratory services would have to be dealt with separately.) However, many states are quite large and heterogeneous and the use of substate areas may be advantageous in order to increase the potency of provider incentives. Finally, several states have MSAs on their borders; these states also have substantial border crossing which could be problematic.

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